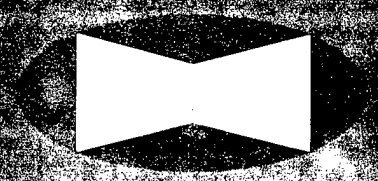
The United States Army Tank-automotive and Armaments Command's



National Automotive Center

TARDEC

The National Automotive Center (NAC) is the Nation's unique laboratory for the development and execution of collaborative research to achieve military ground-vehicle superiority for Force XXI and the Army After Next. The NAC identifies dual needs of the Department of Defense and the commercial automotive sector and then initiates joint government, industry and academic programs to develop and insert new technologies into current and future fleets of military vehicles.

This Strategic Plan outlines the four primary NAC programs which meet the objectives of the future Army ground-vehicle fleet:

- *The Automotive Vehicle Modernization Program*
- *The Automotive Driver Safety Enhancement Program*
- *The Automotive Logistics and Maintenance Improvement Program*
- *The Automotive Manufacturing Innovation Program*

Using cost-shared partnerships and virtual team concepts, the NAC adroitly leverages talent to follow through on the objectives and goals delineated in this Strategic Plan. Composed of members from the government, the automotive industry and academia, the NAC virtual teams enhance the Army's science and technology investment strategy and result in the formation of a world-class technology network to achieve military fleet maneuver excellence, fuel efficiency and vastly reduced logistics.

This Strategic Plan lays the foundation to achieve the Army's future battlefield ground-vehicle performance superiority.

Jerry L. Chapin
Director
Tank-Automotive Research, Development, and Engineering Center

A Strategy for Automotive Superiority for Tomorrow's Defense

1998-2003

For the Soldier...

Table of Contents

The National Automotive Center at a Glance

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Mission

The NAC identifies dual needs of the Department of Defense and the automotive industry. By fostering relationships and forming cost-shared partnerships, the NAC accelerates the exchange and implementation of automotive technologies.

Products

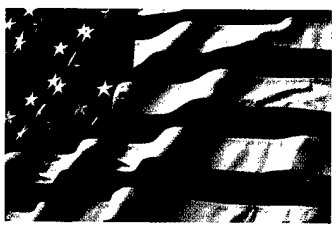
High payoff dual-use automotive component and process technologies.

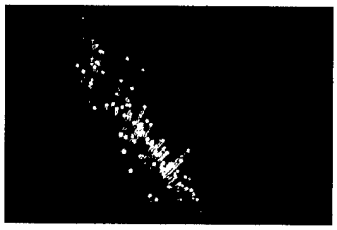
Customers

The NAC's customers include Program Executive Officers, Program/Product Managers, Combat Developers, the Departments of Defense, Energy, Commerce and Transportation, and other federal government agencies.

Partners

The NAC's partners include the commercial automotive industry, numerous universities and other federal government agencies.





People

The NAC is staffed by federal government scientists, engineers, analysts and program management professionals who, with their industry and academic partners, form research, development and demonstration teams to improve military and commercial automotive performance.

Facilities

Located at the Detroit Arsenal, in the heart of the world's automotive capital, the NAC shares the laboratories of its parent organization, the Tank-Automotive Research, Development and Engineering Center – TARDEC, the research facilities of Ford Motor Company, General Motors and Chrysler Corporation, and several major universities.

Fiscal Resources

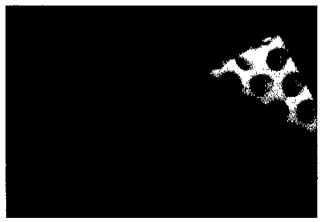
The NAC and its industry partners manage a cost-shared budget in excess of $50 million annually.

Parent Organizations

The United States Army Tank-automotive and Armaments Command (TACOM) and the Tank-Automotive Research, Development and Engineering Center (TARDEC) are the world's foremost developers of main battle tanks, tracked fighting vehicles, tactical bridges, mine clearance and fuel, water and lubricants logistic support equipment. Their customers include the U.S. Army, Navy, Marine Corps and Air Force, as well as the armed forces of 16 foreign nations.

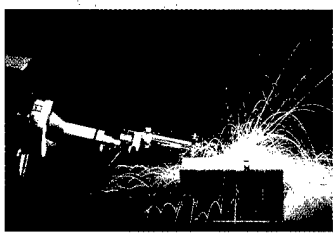
History

The NAC was established to achieve the goals of the Technology Transfer Acts of 1987 and 1989. The organization was chartered by the Secretary of the Army in 1993 as the Army's agent for fostering the development of dual-use automotive technologies by industry, academia and the military services.



The National Automotive Center Today

The President's Technology Policy for Economic Growth, which encourages cost-shared R&D partnerships between government and industry, broadened the NAC's mission. Today the NAC is the Defense Department's leader for developing R&D automotive technology partnerships to strengthen the national security and improve industrial performance. The NAC and its commercial and academic partners are sharing the cost of applying and developing new dual-use technologies to improve automotive performance.



NAC's Vision, Values and Quality Policy

Vision

To become the recognized leader in automotive technology for tomorrow's defense.

Values

The NAC serves defense and commercial interests with drive, integrity, commitment and competence.

Quality Policy

The NAC and its industry and academic partners make smart investments in innovative technologies which promote the production of superior automotive products.

Quality is defined by the customer; the NAC endeavors to meet its customers' needs and exceed their expectations.

The NAC achieves excellence by preventing problems rather than correcting them after they occur.

Each NAC associate is involved with a process to create a product or service and is pledged to enhance the quality of the output and to continuously improve the process.

Each NAC associate has internal and external customers and accepts the obligation to contribute only work of the highest caliber to each of them.

Chapter 1
Strategic Environment

National Security Science and Technology Strategy

As we move into the next century, the nation's security will depend upon a continued commitment to leadership and engagement in global affairs. The challenges that we face will be increasingly complex and our ability to meet those challenges will be greatly influenced by the wisdom of our investments in science and technology.

In the military arena, the challenge is to ready the nation's forces to address a more varied set of threats while concurrently downsizing and restructuring to respond to the defense needs of the 21st century. Investments in science and technology are critical to military preparedness, enabling us to stay on the cutting edge of new developments so that our armed forces remain the best-trained, best-equipped and best-prepared in the world.

Steady investment in science and technology underlies our ability to succeed in high-priority missions, to minimize casualties, to mobilize military services swiftly into coordinated action and to act in concert with other nations to achieve shared security objectives.

To increase performance and reduce the costs of new defense technologies, the President and Congress have launched initiatives that reflect new ways of doing business. Two such initiatives are *Acquisition Reform* and *Dual-Use Technology Research and Development*. These programs remove barriers that separate the defense industry from commercial industry. They ensure that the military services acquire the highest quality equipment at the lowest cost and recognize that the nation can no longer afford to maintain two distinct industrial bases. In their places, a common commercial and defense industrial base will better serve defense needs, enhance U.S. economic competitiveness and provide U.S. industry with the benefit of larger combined markets.

The Interrelationship of the U.S. and World Economies, Technology and the National Defense

Over the past several decades, the U.S. economy has experienced a profound transformation. Thirty years ago, the U.S. economy accounted for well over a third of the world's total income and U.S. companies were leaders in most manufacturing industries. Since World War II, other nations have rebuilt their industries, made improvements in technology, upgraded their education systems and adopted new and innovative management practices.

By 1994, the U.S. contribution to world income had fallen to about a fifth of the world economy, with industries in Europe and Asia now fierce competitors.

With the end of the Cold War, the globalization of markets and rapid technological progress worldwide, foreign competition has put unprecedented pressure on American industry. Advanced

"Science and technology are central to the goals of economic security, military strength, and diplomatic engagement – the vital elements of national security."

–President Bill Clinton

technology has been at the heart of America's competitive advantage; today, technological leadership means the difference between success and failure in the global economy.

The technology base that propels the economy is increasingly crucial for national defense. In a number of important technologies, the defense industry no longer leads the commercial sector. For example, the new technologies that are most critical to our military advantage—software, computer, semiconductors telecommunication, advanced materials and manufacturing technologies—are being driven by fast growing, changing commercial demand. In the past, it was more common to think of technologies as "spinning off" from military development to civilian markets. Technologies today are, in growing numbers, "spinning on" from civilian labs and commercial products to military uses. These dynamic commercial markets must be tapped to provide for a more sophisticated military defense at a lower cost to the taxpayer.

Fully exploiting the technology base to meet economic, defense and global stability goals is thus a growing demand of police and is increasingly important in the face of tight federal budgets. The need to reduce the size of the federal government means that every dollar invested by the government must bring a maximum return to the public and leverage, to the greatest extent possible, the capabilities of the private sector.

The R&D Dilemma

The accelerating pace of technological advances, the increasing cost of research and development, ever-shorter product cycles and rapid worldwide diffusion of technologies mean that many companies are finding it difficult to afford investment in risky or longer term research and development than in the past. For example, in the electronics industry, the lifetime of a personal computer model is less than two years, forcing firms to manage three generations of technology at once and to squeeze out resources for longer term technology-based R&D.

In the semiconductor industry, new plant investments can exceed one billion dollars, with the next generation running two or three times that amount, again drawing resources away from the longer term R&D that would form the base for future industries. Overall, industries are devoting 80 to 90 percent of their R&D resources to short-term product development and process improvement.

Thus, a gap is developing in the innovation system, a gap in funding for mid- and long-range R&D, which threatens to dry up the wells of new technology from which companies must draw to remain competitive in the future. Pressure to realize near-term returns is aggravating, in particular the gap in R&D in the five-to-seven year time frame.

Individual companies are particularly reluctant to move forward with research and development projects when a substantial percentage of the total return may not be recaptured by the investing company. Government risk-sharing can provide a bridge that mitigates underinvestment in research and development and supports broad diffusion

of the benefits of R&D to society. The societal rate of return on R&D investment, where the benefits accrue to many firms and to consumers in the form of less costly, higher quality products, is about twice as high as the average private rate of return on investment for individual firms.

The U.S. Government Reaches Out to Industry

The administration has redesigned government partnership programs to ensure that they are:

- Market-driven, with industry leading the joint research agenda.
- Cost-shared, with the private sector providing a substantial portion of the money as a "good faith" test to make sure technological risk is worth taking.
- Competitive, merit-based and peer-reviewed.
- Evaluated periodically and rigorously to make sure the projects have the intended effect.

Industry-government partnerships such as the Partnership for a New Generation of Vehicles (PNGV), Advanced Battery Consortium, *The National Automotive Center* and projects in the Advanced Technology Program all are examples of industry identifying its longer term needs and sharing the risks and uncertainties in pursuing those developments with the government. In addition to the government, universities are increasingly being sought not only as sources of educated students but also as partners in joint research and development.

Joint government-industry funding can extend time horizons, increase the number of high-risk projects in the national portfolio and fill the gaps that open in the nation's complex and dynamic science and technology system.

The fullest use of technologies developed by public laboratories is also a continuing challenge. If public R&D investments are to continue to pay the kinds of economic dividends they have in the past, the government must improve the management of its own technology-related assets. It must narrow the time gap of technology transfers by bringing technology creators and users closer together. This goal is a principal mission of the National Automotive Center.

Chapter 2

Executing the National Security and Defense Science and Technology Strategy

Defense Science and Technology Strategy

It is critical that defense programs take advantage of cost-conscious, market-driven commercial production and leverage the huge investments in leading-edge process technologies made by private industry. It is also important that defense technologies and systems keep pace with the rapid product development cycles driven in critical areas by a highly dynamic commercial sector.

Dual-use technology research and development is a key component of the Department of Defense's (DoD) investment strategy for maintaining the performance superiority and affordability of U.S. military forces. It builds upon the successful DoD acquisition reform effort. The dual-use technology investment strategy serves to:

- Ensure that key elements of the domestic commercial technology base that are critical for national security remain at the leading edge.
- Support the transitioning of defense-sponsored technology and the integration of military production with the commercial base.
- Facilitate insertion of commercial technologies into military systems.

Dual-Use Application Program (DUAP)

DoD's strategy for implementation of dual-use technology has evolved over the past few years, based on knowledge gained through innovative dual-use programs performed in partnership with the private sector. Acquisition reform prepared the legal, regulatory and operational ground necessary to pursue changes in DoD investment strategies and practices. Building on these efforts, the dual-use approach intends to:

- Create a culture of dual-use as the normal way of doing business in the Services and to develop improved procedures for choosing and conducting dual-use programs.
- Broaden the scope of dual-use to include all aspects of science and technology, new acquisition programs, fielded systems and response to rapidly arising user requirements.
- Extend the application of dual-use products and processes by developing and adopting better insertion strategies.
- Enhance the integration of civilian and military production in order to take advantage of the best practices and economies of scale inherent in commercial manufacturing.
- Improve methods for assessing dual-use programs and products.

The benefits for DoD will be better products developed faster and at lower cost and a vigorous, productive and competitive commercial industrial infrastructure which, when coupled with the superior systems integration capability and defense-unique technologies provided by defense contractors, will ensure a superior U.S. military.

The Dual-Use Application Program consists of three components designed to address different stages in the product life cycle.

- For basic research and technology development, a partnership between DoD and industry shares risk and helps ensure that the results of research will benefit both parties. Dual-Use Science and Technology (DUS&T) is a partnership between DoD and the private sector to co-develop technologies that benefit both partners.
- During the pre-production or early production stages of an acquisition program, additional funding to test and qualify a new technology may be required, although it had not been planned for when the system design was finalized. The Commercial Technology Insertion Program (CTIP) addresses this funding need.
- After the system goes into production and is fielded, new technologies can be utilized to significantly reduce operating and support costs. The Commercial Operating and Support Savings Initiative (COSSI) exploits these opportunities by retrofitting fielded systems with components adapted from commercial technologies.

Superior Quality, Competitive, Multifaceted Research Program

The Department of Defense recognizes that universities, in-house DoD laboratories and industry are all vitally important to the basic research program. University centers, federated laboratories, consortia, individual academic investigators and industry are all modes of conducting research that are addressed by this strategy. DoD will continue to invest broadly across a wide range of technical disciplines and achieve scientific and technological advances by supporting the best research performers. Where appropriate, special programs will bring various types of performers together to achieve specific technical or functional goals.

DoD laboratories operated by the military departments will be both performers and purchasers of research and technology.

Army Science and Technology Strategy

The *Army Science and Technology Master Plan* delineates the National Security and Defense Science and Technology Strategies. The plan focuses on Army science and technology investments that assure timely demonstrations of affordable, technologically advanced weapon system concepts. It highlights the efforts of a world class network of Army-focused government and private research activities. One of the plan's strategic investment objectives is to improve technology transfer and "spin-on" by encouraging partnerships with industry and academia. This "spin-on" of new technology is of increasing importance to the Army science and technology program. The Army's Technology Transfer Initiative is facilitated by the growing DoD adoption of commercial products, practices and processes. The Army conducts technology

"The time has come to leap into the future...Across the board, we've got to streamline, downsize and buy more off the shelf. We've got to consolidate, computerize and commercialize."

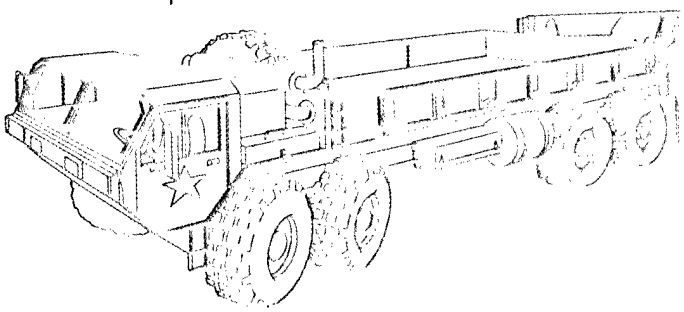
–Secretary of Defense William Cohen

"We are concentrating on such things as dual-use technologies and products that can give us a double payoff with both military and civilian applications. They aid the overall economy, while we reap the benefits of economies of scale and access to cutting edge technologies in the commercial sector."

–Deputy Secretary of Defense Acquisition and Technology R. Noel Longuemare, Jr.

transfer through the use of *DUAP, CTIP* and *COSSI* programs by using the following contractual arrangements:

- *University Research Centers* which foster basic research objectives by leveraging research programs in academic institutions.
- *Cooperative R&D Agreements* (CRADA) which are established between federal government laboratories and one or more commercial companies to facilitate technology transfer between the parties to their mutual benefit.
- *Cooperative Agreements* which are legally established relationships between the government and offerors of R&D proposals, when the principal purpose is to transfer technology, equipment or money to carry out a public purpose. Examples include improving the state of the art of a technology with commercial applications and improving technical capabilities of commercial and academic sectors.
- *Traditional Contracting*
- *The Small Business Innovation Research* (SBIR) Program which was established by Congress in 1982 to promote small business participation in federal research and development and to stimulate the conversion of research findings into commercial applications.
- Dual-needs research and commercial applications are emphasized as principal program objectives.



The U.S. Army Materiel Command (AMC)

The Army Materiel Command equips and sustains the United States Army. Its research, development and engineering centers define, develop and acquire superior technologies to create, improve and procure the Army's weapons systems. These centers and the Army's other laboratories execute the Army's Science and Technology Master Plan.

The U.S. Army Tank-automotive and Armaments Command (TACOM)

TACOM, a subsidiary of the Army Materiel Command, is the world leader in developing, acquiring and supporting munitions, armaments and tracked and wheeled vehicles. In a comparison with the Fortune 500 companies of the private sector, TACOM would fall within the top 100 and rank as the fourth largest domestic automobile company.

The Tank-Automotive Research, Development and Engineering Center (TARDEC)

TARDEC, one of TACOM's two research laboratories, is the world's foremost developer of main battle tanks, tracked fighting vehicles and other military automotive products. It also develops bridging, logistics equipment, fuels, lubricants and mechanical countermine apparatuses. Its customers include the U.S. Army, Navy, Marine Corps and Air Force, as well as the armed forces of 16 foreign nations. TARDEC is responsible for executing the *Army's Science and Technology Master Plan's* Mounted Force science and technology investments strategy. TARDEC meets the challenges of modernizing the U.S. Army Mounted Forces and making it lighter, more lethal and more deployable, while improving its tactical mobility and survivability.

The National Automotive Center (NAC)

Of prime importance to economic growth and national security in the next century is a renewed and efficient transportation system. U.S. highway, air and rail transport systems are in urgent need of improvement. A coordinated public and private research and development effort will provide for future transportation needs: safe and reliable physical infrastructure, information infrastructure for transportation and next generation transportation vehicles.

The NAC is the Defense Department's agency for cooperating with the commercial automotive industry to improve ground transportation vehicles. It is the driving force in numerous shared industry-government technology programs that benefit automotive science. The NAC, with its industry partners, strives to reduce the cost of vehicle ownership, extend service life, improve performance and increase safety for both commercial and military vehicles. The NAC serves the *Department of Defense Dual-Use Technology Concept Program* by emphasizing three key processes: integration of military and commercial production, promotion of technology insertion and investment in dual-use technology.

In achieving its mission, the National Automotive Center complies with the goals of the *National Security Strategy for Science and Technology*, the *Department of Defense Science and Technology Strategy* and the *Army Science and Technology Master Plan.*

The NAC executes the Army Materiel Command's *Technology Generation Mission* and accomplishes the research and development objectives of the U.S. Army Tank-automotive and Armaments Command.

The NAC embraces the guiding principles and vision of its parent organization, TARDEC, and achieves TARDEC's mission: *to serve as the Army's focal point for the development of dual-needs automotive technologies for application to military ground vehicles.*

The National Automotive Center abides by DoD's guiding principles for management of science and technology resources:

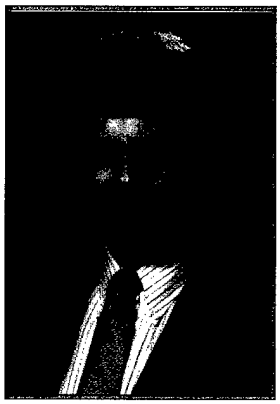
- Transition technology to address warfighting needs
- Reduce cost
- Strengthen the industrial base
- Assure quality

The National Automotive Center incorporates the following imperatives in every developmental program:

- Work with the Warfighters
- Wherever possible, use the same technology and industrial base to build commercial products
- Exploit commercial technologies
- Strengthen technology transfer
- Demonstrate high payoff automotive technologies
- Use the best commercial products, practices and processes
- Insert technologies that reduce the cost of ownership
- Improve manufacturing as a design parameter
- Reduce both acquisition and life-cycle costs
- Insure that joint needs are met
- Consider environmental factors

"Dual-use technology will play an ever-increasing critical role in our acquisition programs. The National Automotive Center is the Army's leader in exploiting dual-use technology opportunities."

–Acting Assistant Secretary of the Army for Research, Development and Acquisition Dr. Ken Oscar



Deputy Assistant Secretary of the Army for Research and Technology— Dr. A. Fenner Milton

Chapter 3
Strategic Goals and Objectives

Commander, U.S. Army Materiel Command General Johnnie E. Wilson

"Company goals should always be geared toward being the best in the world, rather than just slightly better than last year."

Jim Sirek
Vice President for Quality, Xerox Corporation

Management Concept

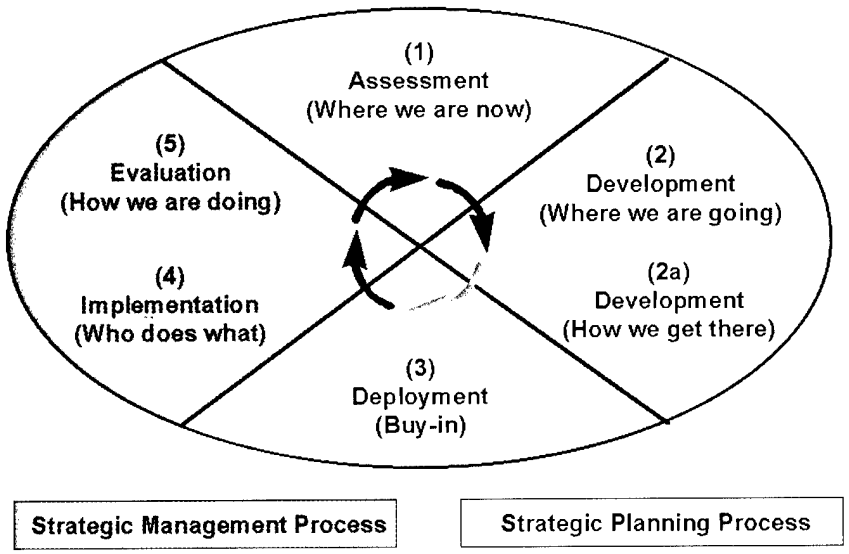
This strategic plan drives activities and programming for a 5-year period. The NAC business plan encompasses the immediate budget year program goals and objectives. It describes the strategies to achieve the goals of the program and outlines the metrics to evaluate progress and results.

The NAC Strategic Leadership Model

Since its establishment in 1992, the NAC has employed a strategic leadership model to conduct both strategic planning and strategic management. The model, shown in Figure 1, provides guidelines for continuous planning. It consists of five phases requiring intense leader and associate interaction and program development and integration. The leadership model is further separated into strategic planning and strategic management processes.

Commander, U.S. Army Tank-automotive and Armaments Command Major General Roy E. Beauchamp

Figure 1: The Strategic Leadership Model



The NAC Integrated Strategic Planning Process

The strategic planning process consists of the first three phases shown in Figure 1. It includes the assessment, development and planning aspects of the deployment phase. The **Assessment Phase** is a detailed assessment of NAC operations. Stakeholders from the Office of the Secretary of Defense (OSD), the Department of the Army (DA), Army Materiel Command (AMC) and Tank-automotive and Armaments Command (TACOM) are interviewed, as well as customers and industry and academic partners. The results of these interviews are combined with an internal self-assessment and strength, weakness, opportunities and threats analyses. Bench marking lessons learned are provided to the NAC core team during a planning conference. The core team consists of the NAC executive team plus key personnel from the technology groups. The NAC Director provides an incisive environmental analysis plus projections of new thrusts based upon DoD guidance and impacts of force realignment.

In the **Development Phase**, the NAC core team meets to design the strategic plan. During this phase, the group reviews and revises as necessary the NAC vision, mission, values, goals, objectives and quality policy. Performance gaps are also identified from the assessment and are included as considerations in the plan. The project plan is reviewed and updated to reflect new requirements.

Finally, in the **Deployment Phase**, an integrated plan is developed to ensure that the strategic goals, objectives and attainment strategies are understood and accepted by all NAC associates, customers and academic and industrial partners. During the deployment phase, the NAC objectives are cascaded to the NAC technology groups and their virtual teams; owners are determined; and timelines, resources and metrics are established. This sets the stage for NAC business planning.

The NAC Integrated Strategic Management Process

The strategic management process consists of the last two phases shown on Figure 1 and emphasizes the continuous flow of work. After the strategic plan is deployed, NAC planning enters the **Implementation Phase**. During this phase, the NAC core team utilizes the results of the deployment and develops the NAC business plan. The business plan provides overall guidance in the areas of human resource development, financial resources and project management for the technology groups. The technology groups are comprised of "virtual" project teams with members from TARDEC, other government labs, the automobile industry and academia. Each team develops its own operating technology transfer plan. Process shortfalls are identified and either improved or reengineered.

As a critical parameter of the **Evaluation Phase**, the NAC principal analyst designs and conducts quarterly reviews and analyses of each program for the executive team. It is during this continuing phase that innovations are introduced, and programs and resources adjusted.

Director, Tank-Automotive Research, Development and Engineering Center Jerry L. Chapin

1998-2003 Strategic Goals and Objectives

The NAC has defined the following nine goals:

Goal 1. Create Lighter, More Mobile, More Supportable, More Fuel Efficient Vehicles

Goal 2. Enhance Driver Safety, Navigation and Communication Capabilities

Goal 3. Reduce the Cost of Military Ground Vehicle Ownership through Operations and Support, and Production Cost Reduction - Safety and Environmental Cost Avoidance

Goal 4. Reduce Automotive Production Costs

Goal 5. Transition New Technologies

Goal 6. Participate in Federal Government-Industry Technology Partnerships

Goal 7. Assume Leadership Roles on all National and International Initiatives Affecting Military Ground Vehicle Systems

Goal 8. Leverage Commercial Industries', Other Government Agencies', and Academia's Large Investment in Innovative (Advanced) Automotive Technology

Goal 9. Enable the Total National Automotive Center to Succeed Through Innovative Program Management

Four of the nine goals are considered technical goals, and the remainder highlight technology transition/infusion, leveraging, partnerships, national initiatives and innovative program management. The NAC's four technical goals are achieved through NAC's four technical programs.

I. The Automotive Vehicle Modernization Program whose goal is to "create lighter, more mobile, more supportable and more fuel efficient vehicles"

II. The Automotive Driver Safety Enhancement Program whose goal is to "enhance driver safety, navigation and communication capabilities"

III. The Automotive Maintenance and Logistics Improvement Program whose goal is to "reduce the cost of military ground vehicle ownership through operations and support, and production cost reduction - safety and environmental cost avoidance"

IV. The Automotive Manufacturing Innovation Program whose goal is to "reduce automotive production costs"

Each goal is owned collectively by the executive team. Each objective is owned by one of the technology groups which assigns responsibility to a single individual.

The NAC technical programs support, and are directly related to, the following Army XXI and Army After Next imperatives:

- Lighter, faster, more mobile force
- Significant reduction in logistic burden
- Integrated data fusion from multiple sensors and intelligent decision-making aids for commanders at all levels

- Countermeasure capabilities to protect integrity/availability of information and sources
- Bioscience/human and organizational enhancement to improve soldier performance and capability
- Power sources other than fossil fuels and batteries
- Ultra-reliable systems

I. The Automotive Vehicle Modernization Program

Goal 1. Create Lighter, More Mobile, More Supportable, More Fuel Efficient Vehicles (Executive Team)

a. Advance chemical grafting surface coatings (Technology Advancement Group)

b. Advance electromechanical suspension system (Technology Advancement Group)

c. Advance composite trailer decking (Technology Advancement Group)

d. Advance micro auxiliary power unit (Technology Advancement Group)

e. Demonstrate feasibility and benefits in reclaiming engine components using advanced material plasma coatings (Technology Demonstration Group)

f. Demonstrate a commercial-based tactical truck (Technology Demonstration Group

g. Advance Japanese silicon carbide for military use (Technology Advancement Group)

h. Demonstrate a high output diesel engine (Technology Demonstration Group)

i. Demonstrate a smart truck (Technology Demonstration Group)

j. Demonstrate a 600-650 HP powerpack (Technology Demonstration Group)

k. Advance diesel fuel injection (Technology Advancement Group)

l. Advance mono-block diesel engine (Technology Advancement Group)

m. Advance soft-switching inverters (Technology Advancement Group)

n. Advance lightweight diesel engine (Technology Advancement Group)

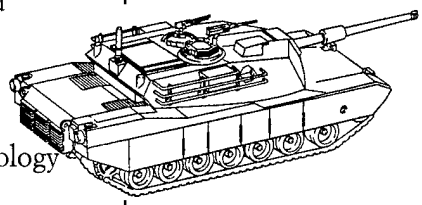
o. Advance optimized motor and motor controller for 54-80,000 lb. trucks (Technology Advancement Group)

p. Advance mobile surgery unit (Technology Advancement Group)

q. Advance lightweight reinforced aluminized tarp (Technology Advancement Group)

r. Advance run-flat tires with countermine capability (Technology Advancement Group)

s. Advance sonic dry clean filter (Technology Advancement Group)



II. The Automotive Driver Safety Enhancement Program

Goal 2. Enhance Driver Safety, Navigation and Communication Capabilities (Executive Team)

a. Demonstrate full color driver interface display with tactical map, vehicle logistics and communication capability (Technology Demonstration Group)

b. Demonstrate anti-lock brake system technology (Technology Demonstration Group)

c. Advance an integrated seat system (Technology Advancement Group)

d. Demonstrate tire inflation status system (Technology Demonstration Group)

e. Demonstrate commercial active braking system (Technology Demonstration Group)

f. Advance microbolometer (Technology Advancement Group)

g. Advance fuel fired absorption for heating, ventilation and air conditioning (Technology Advancement Group)

h. Advance commercial silicon nitride for lightweight armor (Technology Advancement Group)

i. Advance safety products and cab design changes for increased safety (Technology Advancement Group)

III. The Automotive Maintenance and Logistics Improvement Program

Goal 3. Reduce the Cost of Military Ground Vehicle Ownership through Operations and Support, and Production Cost Reduction—Safety and Environmental Cost Avoidance (Executive Team)

a. Advance a fleet logistics management system (Technology Advancement Group)

b. Advance a waste oil disposal system (Technology Advancement Group)

c. Demonstrate a smart diagnostics and repair tool (Technology Demonstration Group)

IV. The Automotive Manufacturing Innovation Program

Goal 4. Reduce Automotive Production Costs (Executive Team)

a. Advance simulation technologies to improve manufacturing (Technology Advancement Group)

b. Advance manufacturing technologies to support rapid and agile manufacturing (Technology Advancement Group)

c. Research high fidelity modeling and simulation advances (Technology Partnership Group)

d. Advance an automotive product development (APD) environment that supports distributed modeling and collaborative design (Technology Advancement Group)

e. Advance recycled polymer and synthetic automotive components (Technology Advancement Group)

f. Advance smaller, lighter, more survivable vehicle structure using composites (Technology Advancement Group)

Transitioning New Automotive Technologies

Goal 5. Transition New Technologies (Executive Team)

a. Rapidly insert promising concepts into development programs (Technology Partnership Group)

b. Demonstrate technology for in-service systems (Technology Demonstration Group)

National Initiatives

Goal 6. Participate in Federal Government-Industry Technology Partnerships (Executive Team)

a. Perform systems analysis for PNGV (Technology Advancement Group)

b. Advance 4SDI four stroke injected engine for PNGV (Technology Advancement Group)

c. Advance manufacturing process for PNGV (Technology Advancement Group)

d. Advance navigation and night vision technologies for Intelligent Transportation System (ITS) (Technology Advancement Group)

e. Advance fleet management technologies for ITS (Technology Advancement Group)

Leadership in Automotive Science and Partnerships

Goal 7. Assume Leadership Roles on all National and International Initiatives Affecting Military Ground Vehicle Systems (Executive Team)

a. Serve as Department of Defense representative for PNGV (Technology Advancement Group) and ITS (Technology Partnership Group)

b. Increase participation in consortia with the commercial automotive industry (Technology Partnership Group)

c. Participate in worldwide symposiums, societies and working groups to acquire and leverage external ground vehicle technology and strengthen internal technical expertise (Technology Partnership Group)

d. Promote technology transfer partnerships through the use of DUAP, CTIP and COSSI (PA&E Group)

Leveraging Industry and Academia in Advanced Automotive Technology

Goal 8. Leverage Commercial Industries', Other Government Agencies' and Academia's Large Investment in Innovative (Advanced) Automotive Technology (Executive Team)

a. Evaluate, identify and enter into advanced automotive technology cooperative research and development agreements (CRADA) that provide a high "return-on-investment" for both the military and commercial/academic communities (Technology Partnership Group)

b. Increase the number of Army and Department of Defense SBIR Phase I, II and III awards in technology areas related to military ground vehicle systems (Technology Partnership Group)

c. Promote cooperative agreements with commercial industry that advance state-of-the-art technologies in critical automotive related ideas (Technology Advancement Group)

d. Make use of collaborative automotive technology contracts with commercial industry, particularly smaller size organizations, using broad agency announcements (PA&E Group)

e. With the commercial automotive industry, solidify key joint technology demonstration programs that make particular use of advanced commercial and military automotive technologies (Technology Demonstration Group)

f. Leverage research programs through the Automotive Research Center (Technology Partnership Group)

Enabling the National Automotive Center Program

Goal 9. Enable the Total National Automotive Center to Succeed Through Innovative Program Management (Executive Team)

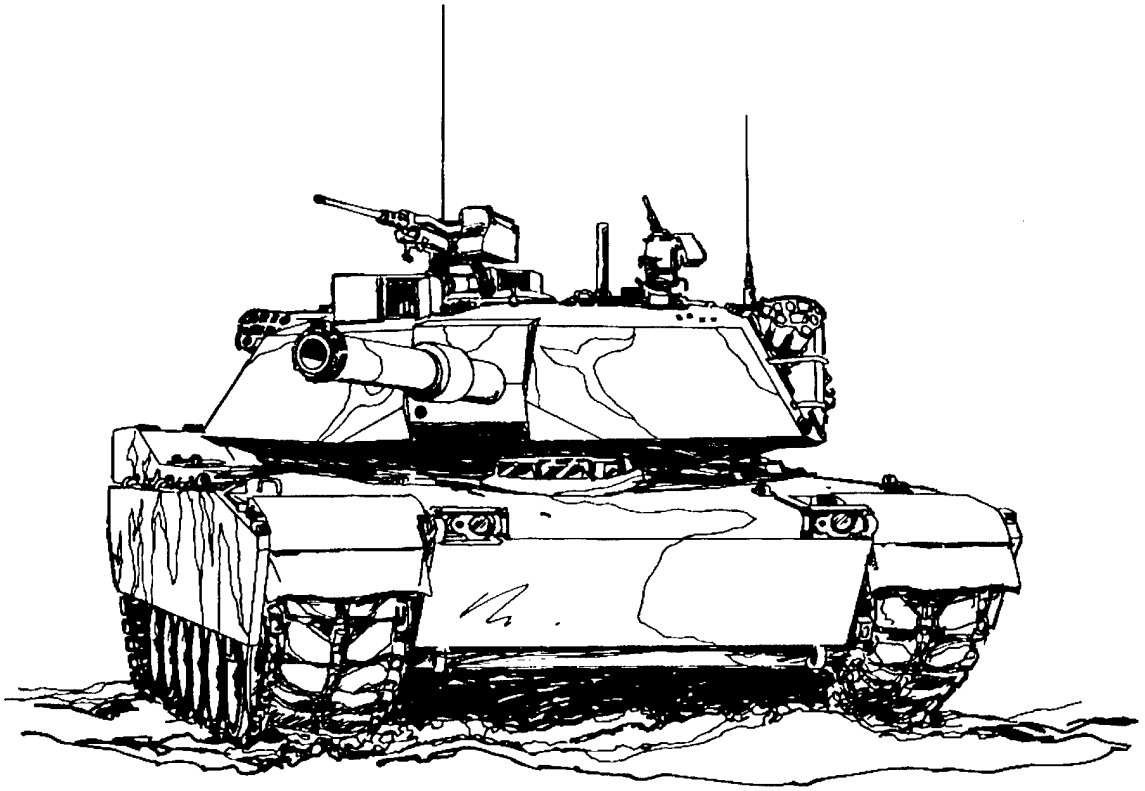
a. Utilize all types of contractual options to expand development and implementation of dual-use technologies (PA&E Group)

b. Establish a professional development program that provides all employees with the competencies to reach their potential and excel in their contributions (Executive Team)

c. Modernize equipment and workstations used to conduct business through the NAC (PA&E group)

d. Develop a robust military ground vehicle and commercial automotive industry "prioritized" needs assessment (PA&E Group)

e. Identify "high payoff," "high return-on-investment" advanced automotive technologies that reside in government agencies, academia and commercial industry (PA&E Group)



Chapter 4
Managing Automotive Technology Transfer

The NAC Quality Policy

The NAC and its industry and academic partners make smart investments in innovative technologies which promote the production of superior automotive products.

Quality is defined by the customer; the NAC endeavors to meet its customers' needs and exceed their expectations.

The NAC achieves quality and excellence by preventing problems rather than correcting them after they occur.

Each NAC associate is involved with a process to create a product or service and is pledged to enhance the quality of the output and to continuously improve the process.

Each NAC associate has internal and external customers and accepts the obligation to contribute only work of the highest caliber to each of them.

This dynamic policy statement reflects each NAC associate's commitment to pursuing continuous quality improvement practices and developing and strengthening technology development partnerships with industry and academia which lead to higher quality automotive products.

The Spearhead in Dual-Use Technology Application

The NAC's first projects were the initial Defense Department overtures to the automobile industry for sharing dual-use technology. Today, the NAC is the federal government's spearhead for developing R&D automotive partnerships to strengthen national security and improve industrial performance.

Cost-Shared Partnerships

The desired outcome of cost-shared partnerships is to accelerate the development, exchange and implementation of technologies which meet both commercial and defense needs. As the primary implementer of the Department of Defense Dual-Use Technology Transfer Program, the NAC has developed a highly flexible organization and work processes that enable it to exercise all options available for the establishment of technology partnerships—focused on products!

As the Army, with the NAC as its primary agent, gains increased experience and success with the tools allowing joint development with industry, DoD plans to transition the Dual-Use Technology

"We are not just planning for the future; we are inventing it!"

Thomas W. Sidlick
CEO
Chrysler Financial Corp.

Program to the Services and retain a role primarily in the areas of education, oversight and policy development. Funding by DoD continues in fiscal year 1998, but DoD will play a less significant role in the selection and funding in fiscal year 1999. A complete hand off of the initiative to the services should occur in fiscal year 2000.

The Commercial Technology Insertion Program

The Commercial Technology Insertion Program (CTIP) is designed to use rapidly developing commercial technologies to substantially improve the performance and affordability of weapon systems nearing or just beginning production. As a weapon system moves from research toward production, its design generally becomes less open to unplanned technology options. CTIP provides a way to overcome this barrier by facilitating the introduction of new commercial technologies, primarily during the engineering and manufacturing development phase of the acquisition program. By helping to fund the cost of the non-recurring engineering, testing and qualification needed to ensure system performance, CTIP provides an alternate funding path for the program manager. NAC associates are instrumental in the identification of technologies for possible insertion in program executive officers' and program and project managers' systems.

The Commercial Operating and Support Savings Initiative

A major focus of DoD's and the NAC's dual-use approach is the reduction of operation and support costs in fielded systems. Some 65 to 70 percent of the life cycle costs of major U.S. systems are incurred after those systems are fielded. As the Army's weapons systems age, life cycle costs tend to grow. Money to maintain and operate the older equipment is not available to develop or buy new systems. Modernization is the loser. The Commercial Operating and Support Savings Initiative (COSSI) reduces operations and support costs of fielded systems by using commercial technologies to reduce reliability, maintainability and sustainability costs.

COSSI reduces the up-front resource risks of inserting a different technology into a military system to program managers and uses new contractual instruments to make the DoD a more attractive customer to commercial firms. COSSI uses authorities provided by Section 845 of Public Law 103-160 and Section 804 of Public Law 104-201 to carry out prototype projects that will reduce the operations and support costs of weapons and weapons systems. COSSI offers commercial firms an opportunity to provide prototypes based on commercial products or processes that have been adapted and qualified for insertion into a system. To contain industry's up-front risks, the NAC and the private companies will share the costs of developing and qualifying the prototype in Stage I. Each selected proposer will perform the non-recurring engineering required to create a prototype that can be used in a system. The proposer will also perform the testing needed to verify that the inserted prototype will yield operations and support cost savings and maintain current system level performance.

The Department of Defense Dual-Use Technology Program

As described in Chapter 2, projects designed in the DUS&T, the CTIP and the COSSI will often promote the use of partnerships and consortia. These arrangements combine the talents of the defense and commercial sectors and draw additional skills and inputs from academic institutions and other nonprofit organizations.

The projects often utilize cost sharing which lowers the cost of developing a technology or product, but more importantly provides assurance that the industry team is committed to the project and believes in the commercial viability of the outcome. The use of innovative contracting practices allows participation in the Dual-Use Technology Program by highly-innovative commercial firms that are not traditional government contractors.

The Science and Technology Initiative

Private sector funding for R&D in the U.S. now surpasses that of DoD by a margin of two to one. This large commercial investment means that the commercial sector is the driving force behind the majority of new U.S. technological developments. The DoD Science and Technology Initiative must leverage commercial technology investments to improve military capabilities. Leveraging automotive technologies is one of the major tasks of the NAC.

DUS&T was funded at $85M in fiscal year 1997. This was accomplished through the use of funding mechanisms authorized under 10 U.S.C. 2358 and 2371, Other Transactions and Cooperative Agreements and initiation of pilot dual-use development programs by the NAC. The Army identified proposals from industry for this initiative. Of the 19 nominations from the NAC, 14 were selected.

All of the new projects will meet the following criteria:

- **Cost sharing.** At least 50% of the cost of each project will be provided "in-kind" by industry. The remaining cost will be shared by either the Army or the DUAP.
- **Competitively awarded.** Awards to industry will be competitive and based on merit.
- **Innovative Funding Agreements.** Funds will be awarded using non-procurement agreements (i.e., cooperative agreements or other transactions).

COSSI was implemented in fiscal year 1997. Eighty-one industry proposals were evaluated by the Services and thirty were selected for Stage I funding. Six of these initiatives are sponsored by NAC associates. The COSSI for fiscal year 1998 is being strengthened based on experience from fiscal year 1997. As with the Science and Technology Initiative, the Defense Department plans to transition the program to the Services after fiscal year 1999.

Streamlined for 21st Century Operation

The NAC organization is driven by the management concept of "virtual" teams. Processes by which the NAC accomplishes its mission in the Dual-Use Technology Program were developed and the organization was designed to implement these processes. The NAC's "virtual" teams are composed of individuals from industry, government and academia.

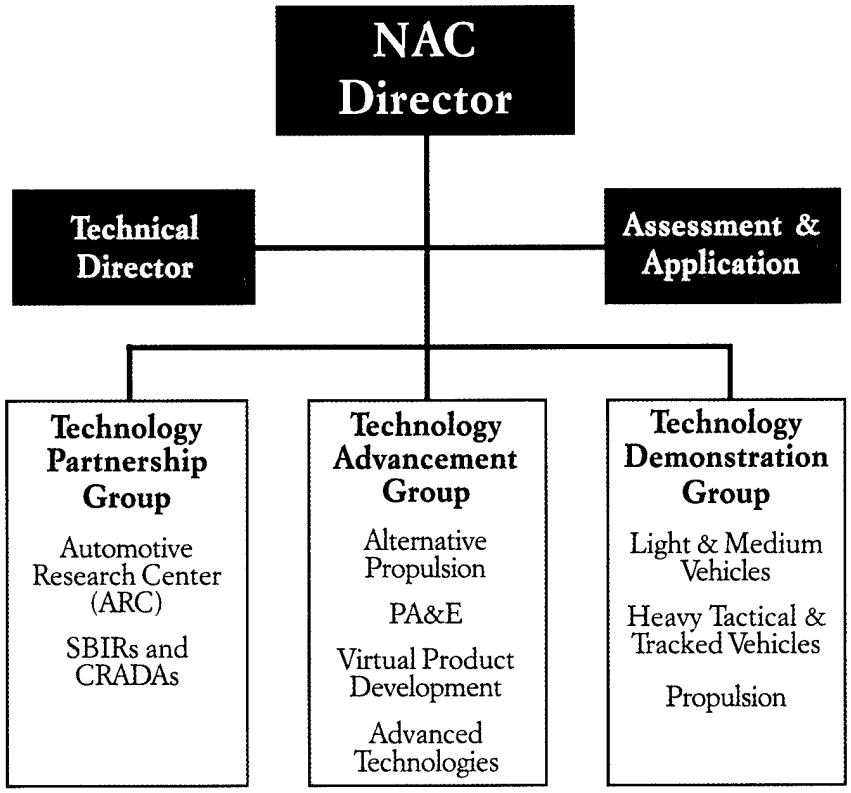
Organization and Structure

The NAC organization is designed with an Executive Team and three technology groups. The Executive Team is composed of: the NAC Director; Technology Partnership, Technology Advancement and Technology Demonstration Group Leaders; the technical director; and the principal analyst. These leaders meet to make decisions regarding future planning, determination of new initiatives and resource allocations. The technical

director advises the NAC director, participates with the universities of the Automotive Research Center and supports all technology teams as requested. The principal analyst manages a small planning, analysis and evaluation element and is responsible for all program assessment and evaluation in conjunction with the technology groups. A newly established Assessment and Applications Office has been developed to assist in the identification of needs and in targeting applications of new technologies for in-service systems.

Additionally a Senior Advisory Board (SAB), established in August, 1996 at the direction of the Assistant Secretary of the Army for Research, Development and Acquisition, meets at least once per year to provide recommendations for the operation, prioritization and implementation of NAC projects and to highlight collaborative research and development initiatives that could potentially meet Army mission needs. The Board includes government executives from the Office of the Deputy Chief of Staff for Operations and Plans, the U.S. Army Materiel Command, program executive offices, TACOM, the Tank-Automotive Research, Development and Engineering Center (TARDEC), the U.S. Army Transportation Center, the Marine Corps Systems Command and the Office of the Director for Defense Research and Engineering. The Defense Advanced Research Projects Agency participates as an observer. The Deputy Assistant Secretary of the Army for Research and Technology chairs the SAB.

There are three technology groups: Partnership, Advancement and Demonstration. The members of each of these groups are themselves team leaders of "virtual" teams comprised of contracted personnel from industry, academia and the government. These "virtual" teams execute the projects under the supervision of the NAC team leaders or NAC appointed team leaders. The structure which describes how the NAC operates is shown in the following graphic:



The Concept of "Virtual Teams"

Every NAC project is managed by a "virtual" team. These projects are objectives from the NAC strategic plan and have been specified in the NAC business plan. The objective has been assigned to a NAC associate who is to execute the project using a "virtual" team.

NAC "virtual" teams are groups of people from academia, industry and other government laboratories, who work together under NAC leadership even though they are geographically separated. The majority are cross-functional groups formed to undertake a project for a finite period of time. Their primary interaction is through a combination of technologies such as the telephone, overnight mail, fax, shared database, the Internet, e-mail, PC-to-PC hook-ups, shared computer screens and video conferencing. Members are mutually accountable for team results.

This arrangement provides significant benefits. Many teams can claim highly talented members who might not otherwise be available because of lack of proximity. The use of shared databases makes information easily accessible by all team members and all can stay current independently. NAC "virtual" teams operate using the model shown on the following page and described below.

Customer Focus

The NAC's ultimate customer is the Soldier. His needs, articulated through the Army's System Managers and the Training and Doctrine Command (TRADOC) Directors of Combat Developments for each branch, form the base and justification for all NAC work. The NAC keeps current on military requirements through functional area teams, user conferences and direct contact with all levels in TRADOC. Further, the NAC, through TARDEC's field representatives, initiates technology to address and rectify immediate field problems. This customer focus is depicted in the center of the diagram to indicate that all individuals and the team have customer needs, expectations and priorities clearly in mind. Even though the team members may be geographically separated, the NAC team leader facilitates a meeting with the customer and all members of the team in attendance. This initial meeting is to ensure that all participants understand exactly what is expected by the customer.

Implementation of the focus on mid- to far-term requirements is more complex since the emphasis is on initial designs of commercial technology, not prototype hardware. In this respect the NAC relies heavily on TRADOC's Future Operational Capabilities (FOCs), which are structured statements of the capabilities that the Army needs to achieve its warfighting goals. The FOCs help guide both the NAC's science and technology activities and industry's R&D initiatives. Using a holistic appraisal of current and future capabilities, the NAC forms a basis for experiments, analyses and other longer term solutions.

Direction

The next outer level of the diagram provides key requirements for the "virtual" team to obtain direction. The NAC team leader is also responsible for the establishment of a formal charter, agreeable to all team members, the customer and the Director of the NAC. This charter is a seminal document and provides parameters, critical success factors and constraints for the entire project. Using the approved charter, the team takes advantage of the initial full attendance meeting to establish their vision: a shared mental image of the team's future contributions and its mission, which will make the mission attainable. In addition, there will be several team goals that must be achieved if the mission is to be successful.

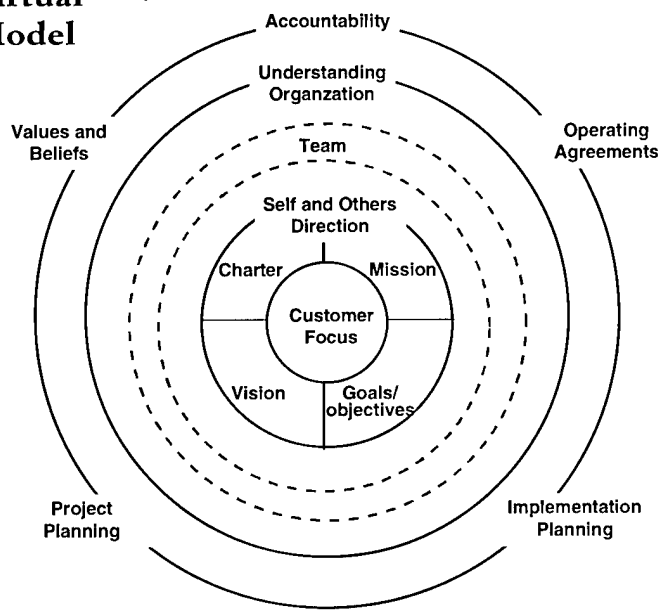
Understanding

In this phase, the team takes time to learn and interpret the four stages of team development, the nature of the team members and their impact on the work. They increase awareness of their own cognitive skills and those of their teammates and the dynamics that will occur in teamwork approaches to problem solving and decision making. Finally, the team establishes, by consensus, operational norms to guide team efforts. The "virtual" team differs from the directed or self-directed, collocated team in that they must determine how they will achieve synergy through appropriate means of communication. The coordination efforts are much more deliberate and structured.

Accountability

In this phase, team members mutually agree on what results the team is expected to achieve with specific plans and activities. In agreeing on accountability, the team establishes operational values by which they expect to work during the term of their team project. This important aspect helps to clear the air of misconceptions from previous relationships and sets the team in focus. In most "virtual" team arrangements, there may be one or more members from academia, some from other government labs and several from industry. The three entities are tied together with a document of commitment, such as a CRADA, SBIR or CA, between the private and public sector participating organizations. The Team Project Plan is detailed in that it must outline responsibilities of each team member to the project and to each of the other team members. Timelines for meetings, completion of requirements and final deliverables which reflect the mission in the charter are spread out and agreed upon by the team. The team works carefully through these tasks, assigning an owner and establishing metrics, timelines and coordination with other individuals or activities and resources required. The team also develops an Implementation Plan to ensure that the project plans and the results of the project will be understood and accepted by the customers and stakeholders. This usually includes marketing information which becomes part of the NAC business plan.

NAC Virtual Team Model



Chapter 5
Leveraging Human Potential

As the result of intense planning sessions, the following human resource goals have been established in consonance with the strategic plan and reflect Mr. Welch's philosophy. The effective accomplishment of all NAC strategic goals and objectives is contingent on building and maintaining a well-managed, highly effective, motivated, professional workforce.

Human Resource Goals

Goal	Strategic Goal Driver
Continuously Improve the Quality of Life	All
Ensure Equal Opportunity for All	All
Maximize Recognition for Deserving Personnel	All
Empower NAC Associates	All
Ensure Effective Education, Training and Development	All
Provide Flexible Work Schedules	All
Recruit Quality Personnel in the Needed Disciplines	All
Provide Effective Management of the Workforce	All
Provide Effective Communications throughout the NAC	All
Achieve Effective Teamwork among NAC Elements	All

"If you're not thinking all the time about making every person more valuable, you don't have a chance."

John F. Welch, Jr.
Chairman & CEO
General Electric Corporation

Recruitment

The NAC draws its human power from the talented resources of its parent organization, TARDEC. NAC associates are brought on for both long term and shorter term rotational assignments. The NAC seeks to identify and recruit from TARDEC outstanding senior engineers, program managers and administrators with proven records of success and knowledge of the organization and the acquisition process.

The NAC seeks to augment the principal staff of full time employees through employment of cooperative students, as they are made available through TARDEC.

Another potential source of human power is from the faculties and staffs of local colleges and universities whose members can be employed through the Intergovernmental Personnel Act (IPA). TARDEC has successfully arranged several of these assignments in recent years.

These resources will become increasingly valuable as TARDEC engineers and scientists available to the NAC grow increasingly scarce.

A core competency study, completed in March 1997, identified key behavior attributes for personnel to be recruited. Men and women possessing these attributes have a much better chance of being quickly integrated into the organization and becoming high performers. NAC hiring strategy is to hire individuals with these characteristics. Specific skills and knowledge are secondary and can be developed through on-the-job training and through NAC training and development programs. The key hiring attributes are:

- ***Achievement Orientation*** A proven desire to perform and succeed; readily takes on challenging objectives; is self-motivated and directed; takes calculated risks; displays initiative and self-confidence.
- ***Flexibility*** Adapts to and works effectively in differing situations and with individuals or groups of different backgrounds.
- ***Relationship Building (Networking)*** Ability to develop and maintain a network of contacts inside and outside the organization.
- ***Teamwork and Cooperation*** Working cooperatively with others to be a part of the team, not separately or competitively.
- ***Customer Service Orientation*** Understands the importance of customer focus; is able to identify and meet or exceed customers' needs.

NAC Work Systems

The NAC is organized into an Executive Team and three technology groups, aligned with its primary mission areas. Each group is headed by a GS-15 level manager. Under each group are major programs and areas, each headed by a GS-14 level manager. Programs are supported by "virtual" teams which are supplemented with both direct and indirect support from TARDEC elements, private industry, academia and other government agencies. (See Chapter 4, **Managing Automotive Technology Transfer**, for further information on organizational structure.)

Management

Effective management at all levels is critical to the NAC's overall success. This is particularly true for this organization because it relies on the effective integration of personnel from several sources. The following areas address critical aspects of management.

Open Door Policy: The NAC Director and all leaders have "open door" policies. All associates, team members, partners and support personnel are encouraged to air their ideas, suggestions, concerns and complaints to an appropriate NAC leader. Using the "chain of command" is the preferred method of redress.

Employee Involvement: The NAC values input from its associates. The primary means of obtaining input in an open environment is for ideas, comments and complaints to be made directly to NAC team leaders and supervisors. NAC leaders collect input in a variety of other ways–through an annual employee climate survey, at quarterly town meetings led by the NAC Director and through the use of suggestion boxes placed throughout the NAC for use by customers as well as associates.

Performance Evaluation System: The NAC uses the Total Army Performance and Evaluation System (TAPES). It is the NAC's goal to maintain a system that supports and encourages excellence – a system that distinguishes and rewards outstanding performers and provides honest, constructive appraisals for those at

lesser performance levels. The system provides for the establishment of measurable objectives at the start of each annual appraisal period, mid-year progress reviews and end-of-year reviews. During each phase of this process, NAC team leaders and supervisors conduct formal counseling sessions with all rated associates. Supervisors participate in the development and approval of individual and team performance objectives.

Recognition and Awards: Recognition and awards are an important ingredient in rewarding deserving personnel and motivating others toward excellence. The NAC's recognition and awards program includes a wide variety of monetary and non-monetary awards. Monetary incentive awards are linked to the performance evaluation process. Other types of rewards and recognition are regularly given to deserving associates for both sustained performance as well as for special acts or achievements. Team awards are emphasized. Departing personnel are also formally and publicly recognized and thanked for their contributions. The NAC is also alert to opportunities to recognize partners, contractors and other affiliates who contribute to the NAC's success.

Workload Distribution: Given the scarcity of resources to accomplish a wide variety of missions, effective workload distribution is important to ensure that all associates share the workload equally. The NAC Director and group leaders monitor workload distribution at least semi-annually to ensure that the team structure and team resources are appropriate for the size and scope of the missions to which the teams have been assigned.

Cooperation and Teamwork: Cooperation and teamwork are essential. This is not something that just happens. Good teamwork is founded on personnel with honed interpersonal skills and on good internal and cross-communication within the organization. Continuing training efforts reinforce team building and interpersonal communications. Teams work under approved charters and project plans which define mission, goals, objectives, a resource plan, key performance measures (metrics) and milestone schedules.

Communications: Effective communication is a key element in any successful organization. The NAC strives to communicate effectively both internally and externally through a variety of means.

> ***Internal:*** To communicate internally, the NAC uses a combination of written memorandums, informal correspondence, planned meetings and reviews, electronic mail, bulletin boards, telephone and fax media.
>
> ***External:*** The NAC must communicate effectively externally to industry and academic partners, contractors, customers, suppliers and stakeholders. This is accomplished through the development of effective educational tools such as fact sheets, newsletters, information brochures, annual reports and the like. NAC associates are encouraged to publish technology articles and summaries of their projects in Army, Defense, industry and academic publications. The NAC must continue to "tell the story" to the outside community.

Equal Opportunity: The NAC is a leader in providing equal opportunity employment for persons regardless of age, race, religion or gender. Equal opportunity extends beyond employment – it extends to equal opportunity for treatment, for professional development and for advancement.

Empowerment: The NAC is staffed with carefully selected professional personnel. These individuals are empowered and their

teams are a dynamic force multiplier which contribute immensely to improved quality, productivity, and employee and customer satisfaction. The NAC leadership, with associate input, establishes parameters and ground rules for the empowerment of teams and individuals.

Counseling: In addition to performance counseling, leaders are available to provide any other form of counseling to NAC associates as may be required (e.g., personal matters, conduct).

Employee Education, Training, and Development

Mission Support: NAC education and training is focused on those knowledges and skills required to perform individual and team missions. These have been identified in a training needs assessment as:

Skills:

- Interpersonal Communications
- Planning and Project Management
- Motivating and Marketing
- Innovative Problem Solving
- Interactive Listening
- Team Building
- Providing and Receiving Feedback
- Conflict Resolution
- Customer Service

Knowledge:

- Keeping current with new technologies and their potential military applications
- The budget process - how to fight for resources
- Basic knowledge of the NAC and its functions
- How TACOM and TARDEC support systems work
- Military and commercial systems acquisition processes
- Developments and trends in the commercial automotive industry
- Governing Army regulations and policies (e.g., dual-use, CRADAs, T^2)

Professional Development: The NAC encourages the professional development of all associates and supports attendance in career-related college and university programs through assistance, rotational assignments and consideration of work schedules.

Delivery of Education and Training: Training and education are effected through TACOM University. Education and training of NAC associates take many forms. These include:

- Formal training classes and courses off-site
- Classes, courses and seminars on-site sponsored by TACOM
- Classes, courses, seminars and workshops customized for the NAC and taught in-house
- College and university advanced degree programs
- Special seminars and workshops led by NAC subject matter experts
- On-the-job reinforcement of knowledge and skills
- Correspondence courses

New Employee Orientation: Joining the NAC, even for experienced TARDEC personnel, may require considerable adjustment. To minimize this adjustment, all newly assigned personnel undergo a NAC mini-orientation. This includes: an office call with the Director, meeting group and team leaders and other key NAC and TARDEC staff; briefings on NAC history,

missions, functions, goals and objectives, ongoing programs, administrative policies and procedures; and "reading files" of relevant documents. Personnel new to TACOM or TARDEC also undergo new employee in-processing prescribed by those agencies. The new employee orientation is complemented by the assignment of a ***NAC sponsor***. The sponsor ensures that all in-processing requirements are met and that the new associate is made to feel "at home" and integrated into the NAC as quickly and effectively as possible.

Evaluation and Improvement of Education and Training: NAC associate directors are responsible for overseeing and evaluating the education and training of their personnel. The ***NAC Executive Team*** meets annually to review the past year's training and to review and establish training goals, objectives and priorities for the upcoming year.

Quality of Life

Recreational and Organizational Activities: The NAC participates in all TARDEC and TACOM organized recreational and organizational activities. These include annual Organization Day picnics, holiday parties, picnics, golf and bowling tournaments, intramural softball and golf and other special events. Special NAC events are also held to promote teamwork and organizational unity and esprit de corps.

Day Care and Work Schedules: NAC work schedules are flexible. Personnel with child care or other family responsibilities are accommodated as best possible. Leaders are empowered to approve modified work schedules within the scope of a 40-hour week. Compressed work schedules are also optional for NAC employees. These schedules are governed by TACOM civilian personnel policy.

Community Service: The NAC desires to be a good citizen within the community. NAC associates participate individually in the community as teachers, scout leaders, youth team coaches and mentors and through membership in community clubs and other service organizations. The NAC also makes positive contributions to the community and further establishes the NAC's corporate identity through organized group community participation.

Health and Fitness: Proper health and fitness is essential to effective performance. The TACOM Fitness Center is available to NAC personnel. TACOM frequently offers seminars and classes on topics such as weight control, smoking cessation and stress management. NAC personnel are encouraged to enroll and attend.

Safety and the Environment: The NAC desires to maintain a work environment free of physical and environmental hazards for all NAC associates. The focus is on prevention. All NAC associates are charged with the responsibility to report safety hazards as soon as they are observed.

Facilities: The NAC seeks to maintain modern, state-of-the-art office spaces and equipment. The TARDEC annual facilities plan addresses problems and potential enhancements and allocates available resources toward facilities improvement projects. The NAC minimizes office moves and keeps the workforce informed of ongoing and planned facilities modifications and movements.

Sexual Harassment: The NAC maintains a work environment free of sexual harassment. In addition to a "zero tolerance" policy, the NAC sponsors annual refresher training to ensure understanding and sensitivity on the part of all NAC associates and to prevent any confusion regarding intent or policy with regards to sexual harassment.

Chapter 6
The Technical Program Plan

NAC's four highly-focused technical programs correspond directly to the organization's four technical goals and embody NAC's mission:

- **Technical Program I. The Automotive Vehicle Modernization Program**
- **Technical Program II. The Automotive Driver Safety and Comfort Enhancement Program**
- **Technical Program III. The Automotive Logistics and Maintenance Improvement Program**
- **Technical Program IV. The Automotive Manufacturing Innovation Program**

These programs are addressed by a variety of projects. The projects are fully described, with objectives and milestones, in the following charts:

Project Name	Thrust	Short Description (Task and Objective)	Need/Deficiency	Military Benefit	Commercial Benefit	Final Product	Customer(s)	Partner(s)	Contractor(s)	Funding Category	Contracting Mechanism	Total Cost (Funding Source)	NAC Business Group
Advanced Fuel Injection	Autmv Vehicle Modernization	**Advanced Diesel Engine Fuel Injection.** Provide critical technological building block for optimizing advanced diesel engine fuel injection performance through high pressure, common rail, Piezoelectric Fuel	Improve performance of military diesel engines through advanced engine fuel injection	Vehicle compactness, high power density, significant weight reduction, outstanding fuel economy, reduced production and life cycle costs	Basis for development of light weight, fuel efficient, high performance, low emission and cost effective advanced diesel engines	Advanced fuel injection system	PEO-GCSS DSA	USCAR-PNGV (Chrysler, Ford, GM)	N/A	6.2	Other Transaction, DUAP	**$1,508,000 Total** $ 377,000 DUAP $ 377,000 NAC $ 754,000 Ind	Tech Advance
Alternative Vehicle Propulsion	Autmv Vehicle Modernization	**Unified government, industry and university effort to research alternative propulsion enabling technologies.** Assess and develop promising alternative vehicle propulsion technologies such as natural gas, fuel cell and electric drive.	To reduce fuel consumption, battlefield maintenance, fuel resupply and increase deployability.	Operation and support cost reduction for military vehicles while developing technologies for use of alternative fuels	Technology developed can be applied to commercial and fleet vehicles to reduce operation and support costs.	Advanced research in alternative fuels technologies.	PEO GCSS DSA	TBD	TBD	6.2	Other Transaction, Co-op Agmt	**Unknown** funding of $2,500,000 under Plus-Up	Tech Adv
Anti-Lock Brake System (ABS)/Low Speed Traction Control (FY96)	Autmv Driver Safety & Comfort Enhancement	**Utilize Commercial ABS to Satisfy Design Needs of HMMWV Platform.** Consider the needs of the HMMWV in the ABS/low speed traction control design.	Assess feasibility of utilizing commercial anti-lock brake system to enhance safety	Increased vehicle control and mobility	Technology improvements developed for ABS can be applied to 9-19,000 lb vehicles in the commercial market	Anti-lock brake system	PEO GCSS	ITT Automotive	N/A	6.2	Other Transaction, 96 BAA	**$1,700,000 Total** $ 500,000 NAC $1,200,000 Ind	Tech Demo
Auto Product Development Framework	Autmv Mfg Innovation	**Distributed Computer Software Infrastructure.** Develop and transfer core ADP technologies between DoD and automotive industry.	Streamline military product development processes and reduce total cost of ownership for military fleet	Interactive environment with other Services without same software, models etc.	Access to military and commercial resources, laboratories, supercomputing capabilities and military markets.	Tri-service product development engineering Extranet	PEOs/PMs, system integrators and their suppliers. ARC-Autmv Rsrch Cen	TBD	TASC	6.2 6.3	Other Transaction, Engr Spt Contract	**$2M Total** $1M NAC $1M Ind and Academia	Tech Advance
Automotive Collaborative Vehicle Design Framework	Autmv Mfg Innovation	**Commercially-based distributed computer process integration framework.** Develop technology for cost effective automotive electronics design, development, test, manufacturing and	Reduce maintenance and expansion costs	Enhance system design development capability	Reduce development time and costs associated with automotive embedded systems.	Embedded systems product development engineering Extranet.	Commercial & military automotive system integrators & embedded systems developers	TASC Motorola	N/A	6.2 6.3	Other Transaction, DUAP	**$4,950,000 Total** $1,237,500 DUAP $1,187,525 NAC $2,524,975 Ind	Tech Advance
COMBATT	Autmv Vehicle Modernization	**Light Tactical Vehicle on Commercial Light Truck Platform.** Design and demonstrate next generation light tactical vehicles based on equivalent commercial platforms.	Aging of HMMWV fleet	Prototype development of a potential follow-on vehicle to replace HMMWV	More robust commercial technology	4 prototype vehicles (1 HMMWV, 1 veh ea-Ford, Chrysler & General Motors) and advanced automotive	DSA PM-LTV	ERIM Intl Inc.; Chrysler Ford General Motors AM General	N/A	6.2	Other Transaction, DUAP	**$14,688,000 Total** $ 3,672,000 DUAP $ 3,672,000 NAC $ 7,343,802 Ind	Tech Demo
Commercial Silicon Nitride for Lightweight Armor	Autmv Vehicle Modernization	**Determine if Lightweight E-process Silicon Nitride is Applicable for Military Armor.** Material characterization; develop manufacturing process; fabricate tiles; ballistic testing; development kits.	Competitive-cost alternative to aluminum-oxide ceramics for light-threat ballistic protection (direct fire threats)	Improved vehicle and soldier survivablity	Improved penetration protection in commercial armored vehicles, personnel body armor (law enforcement, VIP)	Ballistic performance demonstration & manufacturing demonstration	PEO GCSS DSA	Eaton Corp	TBD-award pending	6.2	Other Transaction, NAC DUAP	**$1,356,011 Total** $ 649,521 NAC $ 706,490 Ind	Tech Advance
Composite Trailer Decking	Autmv Vehicle Modernization	**Composite Planks for Trailer Decking.** Develop, fabricate and test composite decking.	Improve durability of vehicle decking on military transport vehicles	Composite decking material with cost and durability characteristics superior to current wood planking. Significant O&S cost reduction.	Composite decking material with cost and durability characteristics superior to current wood planking.	Decking material for 2 trailers.	DSA:	None	TBD-award pending	6.2	Contract BAA	**$284,010 Total**	Tech Advance

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Driver Interface Device	Autmv Driver Safety & Comfort Enhancement	**Full Color Driver Interface Display with Navigation Map, Vehicle Logistics and Satellite Communications.** Design and fabricate full color driver interface display with navigation map, vehicle logistics and satellite communications.	Improve location, identification and dispatching and communication capability for Command and Control (C2) purposes	Real time data exchange, C2 capability	GPS and mapping applications can be utilized by commercial fleets	Full color driver interface with added on-board capabilities	PEO GCSS DSA	Driver Tech QSI Utah State Univ	N/A	6.2	Other Trans, BAA Contract BAA Contract BAA	**$725,000 Total** $354,000 NAC $371,000 Ind	Tech Demo
Electro Mechanical Suspension System	Autmv Vehicle Modernization	**Improved Suspension System for Electric and Hybrid Vehicles**. Develop and demonstrate electromechanical suspension.	Address future military vehicle suspension improvements	Enhanced off-road mobility, speed and ride	Improve suspension systems for commercial vehicles	Electromechanical suspension system applied to HMMWV	PEO GCSS DSA	None	Univ of TX	6.2	Contract BAA	**$1,019,920 Total** $ 509, 625 NAC $ 509,625 DARPA	Tech Advance
Electronically Controlled Active Braking System for Medium Duty Vehicles	Autmv Driver Safety & Comfort Enhancement	**Active Braking System and Low Speed Tracking Control. Hydraulic Control Unit, Electric Control Unit.** Demonstrate commercial active braking system and low speed traction control on a HMMWV.	Provide HMMWVs with anti-lock brake system for better improved traction control	Reduced costs, enhanced performance and improved safety	Technology improvements developed for ABS can be applied to 9-19,000 lb vehicles in the commercial market	HMMWV with active braking system and low speed traction control	PEO GCSS	ITT Automotive	N/A	6.2	Other Transaction, DUAP	**$2,950,000 Total** $ 475,000 DUAP $ 475,000 NAC $2,000,000 Ind	Tech Demo
Enhanced Crash Protection	Autmv Driver Safety & Comfort Enhancement	**Safety Products and Cab Design Changes for Increased Safety of Vehicle Occupants.** Identify safety products and cab design changes which decrease injury and fatality and result in reduction of operational	Improve safety and survivability for drivers and occupants of military vehicles	Reduced injuries/fatalities and associated costs	Improved vehicle cab design for commercial vehicles resulting in reduction in injuries	Technical report which includes product and concept sketches, test results and cost benefit analysis	DSA	Simula Technologies , Inc.	N/A	6.2	Other Transaction, DUAP	**$432,802 Total** $104,847 DUAP $111,554 NAC $216,401 Ind	Tech Advance
Fleet Logistics Management	Autmv Maint & Log Improvement	**An Integrated System to Increase Efficiency of Assembling Combat Assets Using Bar Coding, GDS Mapping and Traffic Management Strategies.** Assemble off shelf components and combine with traffic management strategies.	Improve distribution of assets (logistics, vehicles and supplies)	Enhance asset visibility and convoy assembly	Improve commercial sector real time visibility of assets	Integrated system for asset management and visibility	PEO GCSS DSA	None	East Tenn Univ; Raytheon-Savi	6.2	Contract BAA	**$513,000 Total**	Tech Demo
Fuel Fired Absorption HVAC for Military Tanks and Commercial Vehicles	Autmv Driver Safety & Comfort Enhancement	**Fuel Fired Heating and Air Conditioning Unit which Complies with EPA Requirements for Overnight Engine Idling.** Develop fuel fired HVAC for commercial vehicles to enable truckers to heat and cool sleeper cabins without violating EPA standards.	Affordable retrofit for military vehicles	Affordable retrofit for air conditioning Army tactical truck fleet and technology base for development of HVAC for combat vehicles	Enable commercial vehicles and trucks to heat and cool sleeper cabins while meeting EPA standards	HVAC Unit for commercial trucks and feasibility demo for military trucks commercial production prototype	PEO GCSS DSA	Rocky Research Inc.(recipient) and Bergstrom Inc.	N/A	6.2	Other Transaction, DUAP	**$1,496,000 Total** $ 365,460 DUAP $ 365,693 NAC $ 764,847 Ind	Tech Advance
Heavy Truck Powerpack Enhancement	Autmv Vehicle Modernization	**500-650 HP Powerpack. Increased Horsepower and EPA cert for Heavy Truck Platforms.** Through applied research and system integration demonstrate an advanced 500-650 HP powerpack with SAE Serial Databus which meets EPA 2000 emissions standards.	High horsepower mission compliant diesel engine for heavy trucks	Environmental compliance; mobility enhancement	Technology to lower exhaust fumes can be applied to commercial trucking fleets	Heavy Truck Powerpack	PEO GCSS DSA	Oshkosh; Detroit Diesel Corp., Allision Trans	N/A	6.2	Other Transaction, DUAP	**$893,466 Total** $ 98,211 DUAP $348,522 NAC $446,733 Ind	Tech Demo

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Heavy Vehicle Improvement Program	Autmv Vehicle Modernization	**Apply Plasma Coatings to Reclaim Worn Engine Components. Improve Performance and Wearability.** Demonstrate reclaimed engine components with plasma coatings have increased wearability and improved performance.	Reduce replacement component cost for out of production engines and engine components	Decreased operations and sustainment costs	Tech transfer of improved replacement part production can be utilized by commercial vehicle fleet	Spray coated components integrated into a demonstration engine to increase performance	PEO GCSS-GSI DSA	DOE ORNL RRAD HTML	N/A	6.2	Contract BAA	**$475,000 Total** $150,000 NAC $325,000 Ind	Tech Demo
High Output Diesel Engine (HODE)	Autmv Vehicle Modernization	**Incorporate Advanced Commercial Diesel Engine Technologies into Future Commercial and Military Vehicles.** Demonstrate technology enhancements that include mobility enhancements, fuel efficiency, and considers EPA certification.	Increase horsepower and efficiency without increasing weight.	Codevelopment of engine technology will increase potential for production of a commercial diesel engine feasible for military use	By developing an engine suitable for military and commercial use industry will achieve lower cost per unit and have a larger market.	Concepts for integration of developed technologies into existing or new engines	PEO GCSS DSA	ICRC DOE	N/A	6.2	Co-op Agmt	**$3,050,000 Total** $1,600,000 NAC $1,000,000 Plus-Up $ 450,000 Ind	Tech Demo
HMMWV 6.2L Engine	Autmv Manufacturing and Innovation Program	**Research directed toward insertion and integration of advanced commercial technologies**. Utilized technology insertion of advanced automotive technology to increase engine horsepower by 25%. Reduce dependence on obsolete commercial components. Use	GM no longer manufactures 6.2L engine the Army needs to increase power and modernize technology while assuring parts replacement	Reduce component replacement part costs while improving engine performance in military vehicles	Technology developed can be applied to commercial and fleet vehicles to reduce operation and support costs.	Technology insertion engine redesign and supporting documentation for 6.2L engine rebuild program	PEO-GCSS DSA	None	ICRC Energy, Inc.	6.2	Task Order	**$4,000,000 Total** NAC (Plus-Up)	Tech Advance
Lightweight Diesel Engine	Autmv Vehicle Modernization	**Light Weight Diesel Engine.** Develop analytical methods, materials, manufacturing technologies and engine components for light weight, high fuel efficiency, high performance diesel engine.	Increase power density engines to meet future mobility requirements of military vehicles	Enables military application of commercially developed technologies	Improved manufacturing processes will result in extending the useful life of present manufacturing and production facilities	Two aluminum reinforced demonstrator engines	DSA	Cummins Diesel Engine Co. Inc.	N/A	6.2	Other Transaction, DUAP	**$956,000 Total** $239,000 DUAP $239,000 NAC $478,000 Ind	Tech Demo
Lightweight Reinforced Aluminized Tarp	Autmv Vehicle Modernization	**Adapt commercial light barrier for use as military tarps.**	Durability insulation improvement	Improved field durability, better insulation.	Trucking insulation	Military tarp for vehicles	DSA HTV MTV Remanufacture Prog	Cadillac Products	N/A	6.2	Other Transaction, NAC DUAP	**$482,500 Total** $241,125 NAC $241,125 Ind	Tech Advance
Micro Auxiliary Power Unit	Autmv Vehicle Modernization	**2 – 5 kw Micro Auxiliary Power Unit (MAPU) Design Based on Automotive Turbocharger Hardware.** Feasibility study to reduce weight and size 50%, with fuel economy and price equal to commercial diesel power units of same rated output.	Shortage of lightweight, quiet, fuel efficient electrical power generators	Reduced size and weight, improved portability	Increased portability, reduced noise compared with diesel power units	Feasibility Study	PEO GCSS	None	Technical Directions, Inc.	6.2	Contract, 96 BAA	**$57,600 Total**	Tech Advance
Microbolometer IR Mirocamera	Autmv Driver Safety & Comfort Enhancement	**Prototype Low Cost Imaging Sensor and Processor for Night Vision Driving Aid.** Produce prototype uncooled optical IR Image Sensor and processor for night vision.	Reduce the costs of driver vision enhancements	Improve driving safety and reduce cost of vision enhancement devices	Technology applicable to commercial automobile market	Night Vision Aid	PEO GCSS DSA	Lockheed Martin	N/A	6.2	Other Transaction, DUAP	**$3,000,000 Total** $ 749,903 DUAP $ 750,097 NAC $1,500,000 Ind	Tech Advance
Mobile Med	Autmv Vehicle Modernization	**State-of-the-art first line medical attention for soldier.** Develop/demonstrate medical and container technology that will provide rapid high quality emergency care and reduce the number of casualties by providing top notch on-site surgical team and state	Improve medical service to and in the field.	Reduced fatalities/permanent injuries during wartime and peacetime scenarios.	Market to third world countries; disaster relief; prison medical care	Virtual design and mock-up for mobile medical container system	Cbt Casualty Care Research Prog, Ft Detrick, MD; Forward Surgical Team, Ft Sam Houston, TX	Mobile Medical Intl Corp	N/A	6.2	NAC DUAP	**$1,350,000 Total** $ 500,000 NAC $ 850,000 Ind	Tech Demo

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Mono-Block Process Development	Autmv Vehicle Modernization	**Mono-Block Diesel Engine.** Develop a manufacturing process that uses powdered metal liner combustion chamber inserts cast in a light alloy, unique mono-block engine.	Improve durability and reliability of military vehicle engines	Cost reduction, reduced weight, improved reliability and durability, enhanced noise vibration characteristics, reduced cooling loads, high efficiency	Future building block for light weight, fuel efficient, high performance, low emissions, and cost effective advanced diesel engine for new generation of fuel	Mono-Block Engine	DSA	Ford Motor Company	N/A	6.2	Other Transaction, DUAP	**$1,042,000 Total** $ 232,000 DUAP $ 289,000 NAC $ 521,000 Ind	Tech Demo
Optimized Motor and Motor Controller	Autmv Vehicle Modernization	**Optimized Motor and Motor Controller for 54-80,000 lb. Trucks.** Develop and demonstrate optimized motor and motor controller with improved starting torque and energy efficiency, lower cost and reduced complexity for hybrid heavy duty electric truck drive	Need for improved fuel economy and acceleration, and more energy efficient electric propulsion motor controller	Commercial availability of a high efficiency, high torque drive system for wheeled vehicles up to 80,000 lbs Gross Vehicle Weight	Reduced truck fuel consumption and emissions; new markets.	Optimized motor and motor controller demo on the CALSTART/DARPA Hybrid Electric Prototype Truck	DSA	ISE Research Inc. (recipient) and CALSTART ISE Rsch	N/A	6.2	Other Transaction, DUAP	**$505,886 Total** $120,093 DUAP $120,094 NAC $265,700 Ind	Tech Advance
Recycled Polymer and Synthetic Automotive Components (Tires)	Autmv Mfg Innovation	**Materials Processing Techniques and Technologies for Tire Recycling.** Demonstrate a new method that uses ground up tires to create virgin rubber	Improve disposal method while meeting future environmental/recycling standards	Dramatically reduce tire disposal costs and decrease environmental impact	Improved disposal of civilian and commercial used/worn tires	Commercially viable method for recycling tires	TACOM-IMMC	DARPA & Ultramer Inc.	Ultramer Inc.	6.2	Other Transaction, DUAP	**$2,362,386 Total** $ 555,175 DUAP $ 555,175 NAC $1,252,036 Ind	Tech Advance
Recycled Rubber Products	Autmv Maint & Log Improvement	Recycling of used Army tires into usable products for US Army and industry.	Reduce Operation and Support costs and provide an environmentally safe methodology for reutilization of used Army tires.	Reduce costs for military parts and environmentally safe disposal method of used tires	Processes derived for military used tires can be applied to the commercial sector.	Demo project will create usable mud flaps and chock blocks suitable for military vehicle usage.	TACOM-IMMC PEO GCSS DSA	QUARK	N/A	6.2	Other Transaction, NAC DUAP	**$204,000 Total** $102,000 NAC $102,000 Ind	Tech Demo
Run-Flat Tires with Countermine Capability	Autmv Vehicle Modernization	**Deliver run-flat inserts for mine-effects properties study.** Deliver xx tires with countermine, run-flat inserts; Government testing to determine mechanisms and characteristics. Improve countermine capability.	Improve Survivability - an element of mine-blast crew protection kit	Improved vehicle survivability	Security vehicle safety, diplomatic vehicle safety.	Mineblast attenuating run-flat tire inserts	PEO GCSS DSA	Hutchinson Ind	N/A	6.2	Other Transaction, NAC DUAP	**$332,350 Total** $165,350 NAC $165,700 Ind	Tech Advance
Seat/Restraint System	Autmv Driver Safety & Comfort Enhancement	**Develop and Demo an Integrated Seat and Seat Belt System.** Analyze accident reports; select commercial seat; simulate and model vehicle crashes; demo seat and restraint system.	Develop and improve seat/restraint system for driver/passenger survivability and safety	Reduced injuries/fatalities and associated costs, and improve soldier safety	Technologies developed can be applied to all commercial vehicles to improve safety of occupants	Integrated seat and restraint system	PEO GCSS DSA	None	ARCCA Inc (Gary Whitman, 215/598-9750)	6.2	Contract BAA	**$260,122 Total**	Tech Advance
Silicon Carbide-Aluminum Metal Matrix Composites (COSSI)	Autmv Vehicle Modernization	**Apply Process Components with Increased Strength and Durability for Reduced Weight.** Demonstrate single pin track replacement for BFV and implement either single or double track pin system including pads. Options for	Reduce Operation and Support costs and reduce weight of military components. Reduce acquisition cost of AMRAAM seeker support structure.	Reduced vehicle weight, increased component performance, reduced Operation and Support cost	Reduced operation and support costs through component life extension	Silicon carbide whiskers, preform technology, and squeeze casting process for military components	PEO GCSS DSA	OSD Title III	Advanced Refractory Technologies	6.3, Title III	DARPA BAA, Other Transaction, Plus Up	**$15,735,853 Total**	Tech Advance
Silicon Carbide-Aluminum Metal Matrix Composites (NATIBO)	Autmv Vehicle Modernization	**Apply Process Components with Increased Strength and Durability for Reduced Weight.** Demonstrate viability of process for double pin track shoe, AMRAAM seeker support structure, and diesel piston study.	Reduce Operation and Support costs and reduce weight of military components. Reduce acquisition cost of AMRAAM seeker support structure.	Reduced vehicle weight, increased component performance, reduced Operation and Support cost	Reduced operation and support costs through component life extension	Silicon carbide whiskers, preform technology, and squeeze casting process for military components	PEO GCSS DSA	Canada DND US Air Force OSD Title III	Advanced Refractory Technologies	6.3, Title III	BAA, Cost Plus Fixed Fee Contract	**$4,967,166Total** $1,000,000 Title III $1,140,000 TARDEC $ 211,710 OSD $ 400,000 NAC $ 770,456 Canada $ 445,000	Tech Advance

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Smart Diagnostics and Repair Tool	Autmv Maint & Log Improvement	**Automotive Diagnostic Repair Tool.** Interface a commercially based, voice controlled, automotive diagnostics repair tool with an FMTV 5 Ton Demonstrator Truck equipped with SAE J1939 Data Bus and electronic control module.	Improve diagnostics and repair in the field	Reduce mean time to repair by providing on-sight diagnostic and repairability information	Improve existing commercial automobile repair capability	5 Ton Truck with computer based smart diagnostics and repair tool	DSA PEO GCSS	Raytheon Trng; Cadillac Div of GM	N/A	6.2	Other Transaction, DUAP	**$2,679,472 Total** $ 602,236 DUAP $ 602,236 NAC $1,475,000 Ind	Tech Demo
Soft-Switching Inverters for AC Adjustable Drives	Autmv Vehicle Modernization	**Soft-Switching Inverters with Four Quadrant Operation.** Evaluate various soft-switching topologies for high power performance motor controller operation (100KW) with four quadrant operation.	Evaluate potential for electric vehicle technology for use in military vehicles	Enables military application of commercially developed technologies	Potential for heavy equipment use	Soft-switching inverters	DSA	PNGV	N/A	6.2	Other Transaction, DUAP	**$611,000 Total** $152,750 DUAP $152,750 NAC $305,000 Ind	Tech Advance
Tire Inflation Status System	Autmv Maint & Log Improvement	**Hand Held Non-Contact Tire Air Pressure Status Device.** Develop, fabricate and test hand held air pressure checking system.	Timely identify and correct loss of tire pressure	Improved fuel economy, O&S cost and safety	Improved fuel economy and safety for commercial vehicles	Hand held tire pressure checking device.	PEO GCSS DSA	Freightliner Inc	N/A	6.2	Contract BAA	**$960,000 Total** $480,000 NAC $480,000 Ind	Tech Advance
Vehicle Surface Coatings	Autmv Vehicle Modernization	**Chemical Grafting Technologies to Improve Vehicle Surface Coatings.** Develop a primer coating to inhibit corrosion on aluminium and steel components.	Need to develop a primer coating that prevents oxidation of metal parts on vehicles	Significant O&S cost reduction; applicable to Marine, Navy and Air Force equipment	Corrosion protection for any vehicle that is utilized in a marine environment and/or corrosive environment	Coating delivered to the NAC to be used to test vehicles and vehicle parts.	DSA	None	Polymer Research Corp of America	6.2	Contract BAA	**$342K Total**	Tech Advance
Virtual Manufacturing Technologies to Support Rapid and Agile Manufacturing	Autmv Mfg Innovation	**Simulation Modeling Technology Linked to Computer Based Instruction.** Identify learning tools to support adoption of agile manufacturing technology by DoD suppliers.	Computer based interactive learning system and improved agile manufacturing process technology	Manufacture components better, faster, cheaper	Software learning system will facilitate upgrade and introduction of new agile manufacturing technology	Numerical control software for PC-based training.		None	Focus:HOPE/ Deneb	6.2	Contract-cost only BAA	**$499,000 Total**	Tech Advance
Voice Instructional Device (VID)	Autmv Maint & Log Improvement	**Development of a wearable, wireless voice and video interface for maintenance computers.** Validation and demonstraton of wireless voice and video interface. Permit mechanics working on vehicles access to maintenance information via computers.	Improve on-site maintenance and repair of military vehicles	Improved readiness by enabling field repair of military vehicles	Technology can be adapted to maintenance and repair of commercial vehicles	Prototype VID sets for selected field demonstrations	PEO GCSS DSA	None	8A Small Business-to be awarded	6.2	To be announced as Contract	**$3,000,000 Total** NAC (Plus-Up)	Tech Demo
Waste Oil Re-Utilization	Autmv Maint & Log Improvement	**System to Reutilize Used Oil.** Demonstrate and validate viability of reutilizing waste oil	Provide environmentally friendly method to reclaim used oil for military vehicles	Capability to handle vast quantities of waste oil in an environmentally responsible manner. Substantial cost savings and avoidance.	Lower maintenance costs through reutilization of used oil while meeting environment standards	Waste oil recycling unit	National Training Center	None	Radian Inc., Alexandria, VA	6.2	Contract	**$400,000 Est Total**	Tech Demo